CHAPTER 4

ELLIS CUP AND PELICAN SAMPLING

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4.1 ELLIS CUP SAMPLING

a. The Ellis cup is a manual device, constructed of lightweight aluminum, designed to draw a sample from grain moving on a conveyor belt. See the FGIS Equipment Handbook for design specifications.

b. To obtain a representative sample with an Ellis cup, the sampler must periodically (approximately once each 500 bushels) draw three cupfuls (a set) of grain from the moving stream. The following chart shows the minimum number of sets that must be drawn from each type of carrier:

Carrier	Minimum Number of Sets
Hopper Car	2 sets per compartment
Boxcar	4 sets
Truck	2 sets
Barge/Ship	1 set per 500 bushels

Figure 1. Minimum Number of Sets

c. When using an Ellis cup, the sample must be drawn at a location in elevator's load-out or load-in system that will ensure its representiveness.

(1) Outbound Grain. Draw the sample after the final elevation of the grain and as close as physically practicable to the end of the loading spout.

(2) Inbound Grain. Draw the sample before or immediately after the initial elevation of the grain.

d. Draw sets at random intervals as follows:

(1) Face "upstream" and firmly grasp the Ellis cup in both hands.

(2) Stand as close to the point where the grain is delivered to the conveyor belt as possible. The area where you stand should be free of loose grain and be well-lighted.

(3) To avoid the possible loss of the Ellis cup, fasten one end of a cord to the cup and the other end to a secure object.

CAUTION: Under no circumstances should the Ellis cup be tied to you or another person

(4) With its open-end facing into the grain flow, insert the heel (curved portion) of the Ellis cup into the center of the grain stream.

(5) Push the open-end downward through the grain until the bottom of the cup is parallel with the belt.

CAUTION: Avoid catching the cup on the splice that connects the belt ends. The location of the splice can be identified by ripples that usually occur over it in the grain stream

(6) When the cup is full, move the open-end of the cup upward and remove the cup from the stream. Pour the contents of the cup into a sample collection container.

(7) Draw two more portions from the stream, one at a point halfway between the center and the right edge of the stream, and the other at a point halfway between the center and the left edge. Pour each cup into the sample collection container.

4.2 PELICAN SAMPLING

a. Pelican samplers are constructed of a russet, top grade cowhide pouch attached to a metal frame. The back edge of the frame is higher than the front to help catch more grain and direct it into the pouch, even when the pelican is not perfectly vertical in the grain stream. See the FGIS Equipment Handbook for design specifications.

b. To obtain a representative sample with a pelican, the sampler must periodically (approximately once each 500 bushels) take a pelican (a cut) of grain from the falling stream. The following chart shows the minimum number of cuts required for each type of carrier.

Carrier	Minimum Number of Cuts
Hopper Car	2 cuts per compartment
Boxcar	4 cuts
Truck	2 cuts
Barge/Ship	1 cut per 500 bushels

Figure 2. Minimum Number of Cuts

c. Take cuts at random intervals as follows:

(1) Have the loading spout positioned so that the pelican can be easily swung through the entire falling stream of grain.

(2) Check your footing and position yourself close to the spout. Be sure that the area is reasonably clear of grain, debris, and any obstacles.

(3) Hold the pelican so that the pouch is next to the falling stream.

(4) Grasp the pelican firmly, then swing it completely through the stream of grain in one continuous motion. The direction of the swing is not specified, but it is important to keep the pelican opening facing into the grain stream throughout the swing and to cut the entire stream of grain.

(5) Pour the contents of the pelican into a sample collection container.

4.3 GRAIN QUALITY CHECKS [1]

When sampling grain being loaded into or unloaded from a unit train (Cu-sum only), a fleet of lash barges (Cu-sum only), a standard-size (river) barge, or an ocean-going vessel:

a. Periodically, monitor elevator operations to ensure that the sample being collected represents the lot being loaded/unloaded.

b. Examine subsamples and component samples for heating, "distinctly low quality" (DLQ), unusual conditions, odor, and infestation. If the lot is being inspected under the Cu-sum plan, also check grading factors. (See figure 1, page 4-6.)

NOTE: If it is not possible to examine subsamples/component samples at the collection site, examine them later at an inspection laboratory

(1) At least once every 5,000 bushels, remove the grain sample from the collection box or container. This sample is called a subsample.

(2) Determine if the subsample is heating, DLQ, has any unusual condition, or has a musty, sour, or commerically objectionable foreign odor.

NOTE: Subsamples may also be examined for insects injurious to stored grain. If procedure is used, the total number of insects found in all sub-samples conprising the component shall be used to determine if the component is "infested." For instance, if one weevil is found in the first subsample and one in the second, the component has two weevils and is considered to be "infested." If the subsamples are checked for insects, it isn't necessary to combine subsamples and examine component samples.

(3) If the subsample is found to be heating, DLQ, have an ununusal condition, or have an off-odor, complete a sample ticket that notes the condition found. Then, place the sample--with the sample ticket--in a separate container and notify your supervisor and the elevator manager immediately.

(4) If the subsample is in sound condition, then it may be combined with the next consecutively-drawn subsample(s) to form a component sample. A component sample represents approximately 10,000 bushels of grain and should be approximately 2,500 grams in size.

(5) Sieve the component sample and then check the grain on top of the sieve and the material that passed through the sieve for insects. Don't sieve more than 1,000 grams at a time.

* Use an 8/64-inch round-hole sieve for corn and soybeans.

1 Offical agency managers, in cooperation with local FGIS field office managers, may modify these procedures, when deemed necessary. See Appendix 1, **Local Quality Control Programs**, for additional information.

* Use a .064-inch X 3/8-inch oblong-hole sieve for other grains.
* With the approval of both the official agency and the local FGIS field office managers, other sieve sizes may be used if needed to optimize particle separation and enhance the examination process.

(6) If insects are detected, note the kind and number of insects found on a sample ticket. Then, place the sample--with the sample ticket--in a separate container and notify your supervisor and the elevator manager immediately.

(7) If the component sample doesn't contain any insects injurious to stored grain, then it may be combined with another component sample(s) to form a sublot or lot sample.

c. Monitor the grain stream, as practical, for foreign material too large to enter the Ellis cup or pelican samplers, such as corn cobs, coal, concrete, stones, wood, paper, glass, lumps, or dead animals. If large foreign material is present in the grain stream, immediately inform your supervisor and the elevator manager. Document your observation on the sample ticket.

NOTE: DO NOT ATTEMPT TO REMOVE OBJECTS FROM THE GRAIN STREAM.

CARRIER(S)	FREQUENCY OF EXAM (Approximate)	FACTOR(S) ANALYZED
Ships/Lash Barges (Cu-sum)	Maximum 5,000 bushels (Subsample)	Odor, heating, DLQ, unusual conditions
	Minimum 10,000 bushels (Component)	Grading factors 1/, Infestation 2/
Unit Trains (Cu-sum) Articulated Railcars (Cu-sum)	Individual car basis (Subsample/Component) Individual "unit" basis (Subsample/Component)	Grading factors 1/, infestation 2/, odor, DLQ, heating, unusual conditions
Articulated Railcars (Single-lot)	Individual "unit" basis	Infestation 2/, odor, heating, DLQ, unusual conditions
Standard Railcars (Single-lot)	Individual car basis	Infestation 2/, odor, heating, DLQ, unusual conditions
Barges (Single-lot & Cum-sum)	Maximum 5,000 bushels (Subsample)	Odor, heating, DLQ, unusual conditions
	Minimum 10,000 bushels (Component)	Infestation 2/
Trucks (Single-lot)	Individual truck basis	Infestation 2/, Odor, heating, DLQ, unusual conditions

Figure 1. Sample Analysis Intervals

[1] Under the Cu-Sum plan, examine for "more than a two grade difference in grade factor results" (see FGIS Grain Inspection Handbook, Book III, for more information about checking the quality of grain loaded aboard ships, lash barges, and unit trains).

[2] Tolerances apply to individual trucks, railcars, rail "units," and barge/ship/unit train components. Minimum sampling rate for bargelots/shiplots is 500 grams for each 2000 bushels sampled.